**AFM** Name Key

**Unit 1 Day 1 Notes – Properties of Functions** Date _____

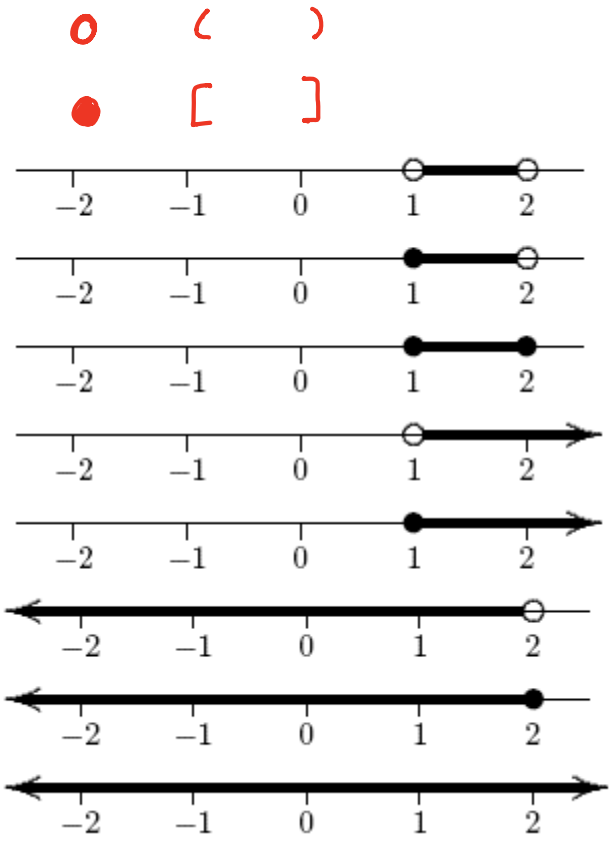
**Function:** a rule that assigns each element ***x*** in a set A to exactly one element called ***f(x)*** in a set B. It is a dependent relationship.

- **Domain:** All possible vales for input (*x*-values)
  - **Increasing:** as *x* increases, *y* increases
  - **Decreasing:** as *x* increases, *y* decreases
- **Range:** all possible values for output (*y*-values)

**Interval Notation:** Used to describe intervals of real numbers.
Parentheses, brackets, *or a combination of both.*

( ): use when an endpoint is NOT included
[ ]: used when an endpoint is included

- The infinity symbol, $\infty$, is used to denote an interval that extends forever to the right.
- The negative infinity symbol, $-\infty$, is used to denote an interval that extends forever to the left.
- The numbers used in interval notation always go from left to right on the number line.
- Union "U": symbol used to join 2 sets of real numbers.




SET NAME USING INTERVAL NOTATION:

$(1, 2)$

$[1, 2)$

$[1, 2]$

$(1, \infty)$

$[1, \infty)$

$(-\infty, 2)$

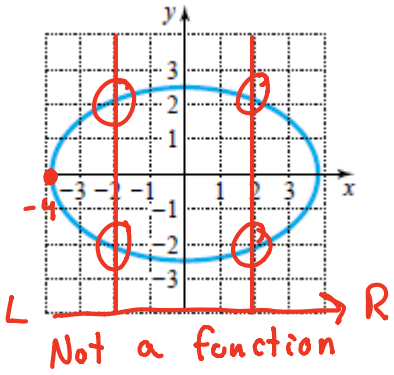
$(-\infty, 2]$

$(-\infty, \infty)$

**The Vertical Line Test:** If a vertical line (pencil) intersects the graph more than one point at a time, the graph is NOT a function.

Examples: Determine if the graph is a function. If so, state the domain and range.

1.

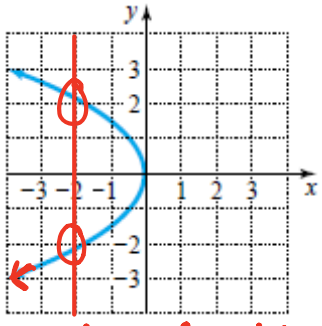



Not a function

(x-values) D: (-4, 4)

(y-values) R: (-2.5, 2.5)

2.

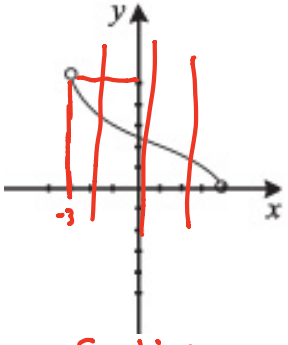



Not a function

D: $(-\infty, 0)$ or $(-\infty, 0]$

R: $(-\infty, \infty)$

3.

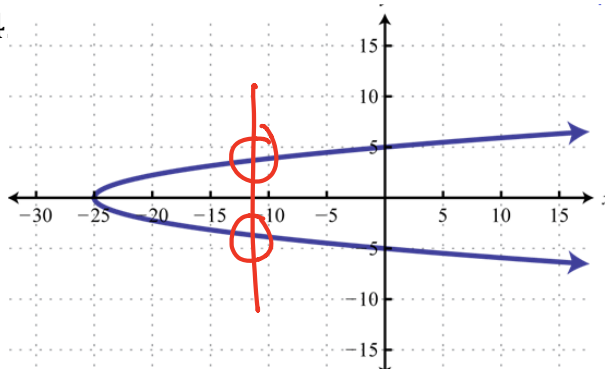



Function

D: (-3, 4]

R: [0, 5)

4

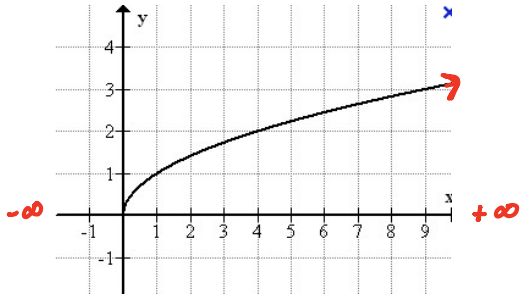


Not a function

D: [-25, ∞)

R: (-∞, ∞)

5.




Function

D: [0, ∞)

R: [0, ∞)

**Properties of Graphs:**

**Asymptotes** (in rational functions): a "line" that the graph of a functions approaches but will never touch

Vertical Asymptote: affects domain; found by setting denominator = 0

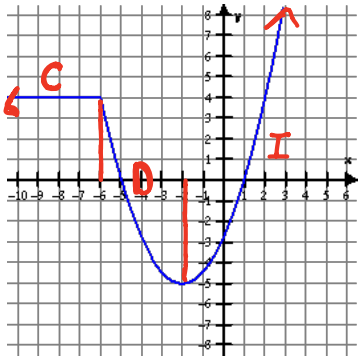
Horizontal: affects the range; based on degree of numerator and denominator

**Open Circle** on graph: value not included

**Closed Circle** on graph: value is included

Examples: Determine the interval on which the function increases, decreases, or is constant.

1.

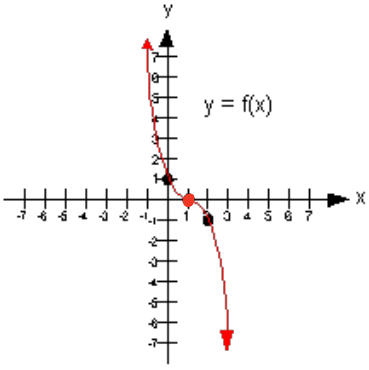



Dec: $(-6, -2]$

Inc: $(-2, \infty)$

Con: $(-\infty, -6]$

2.

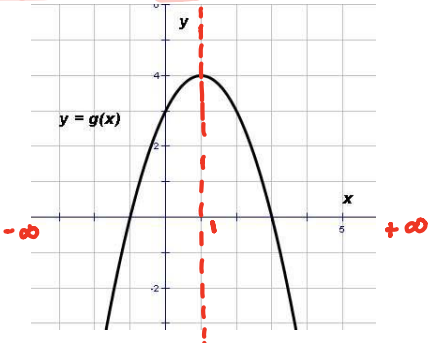



Dec: $[1, \infty)$

Inc: $(-\infty, 1]$

Con: None / N/A

3.

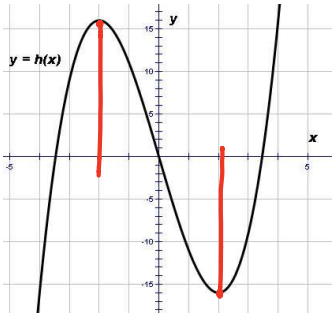



Dec: $(1, \infty)$

Inc: $(-\infty, 1)$

Con: None

4.



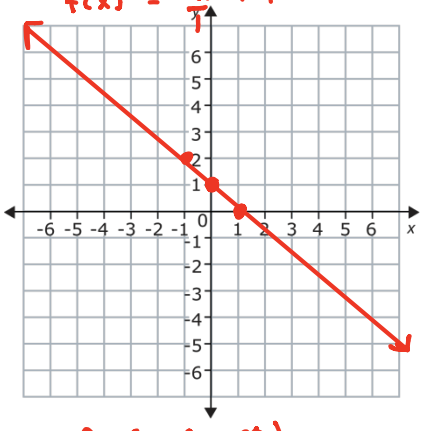

Dec: $(-2, 2)$

Inc: $(-\infty, -2] \cup [2, \infty)$

Sketch the graph of the following functions. Find the domain, range, and the interval of increase/decrease.

1. $f(x) = 1 - x$

$f(x) = -1x + 1$



D: $(-\infty, \infty)$

R: $(-\infty, \infty)$

Con: None

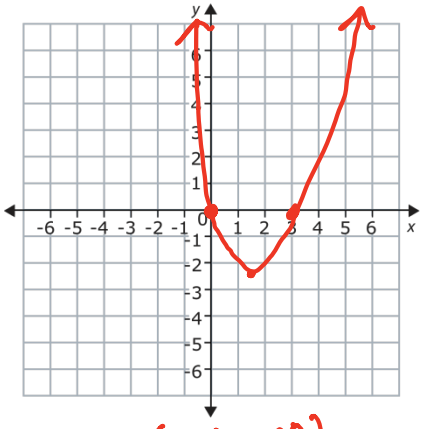
Inc: None

Dec: $(-\infty, \infty)$

2. $g(x) = x^2 - 3x$

$x(x-3) = 0$

$\frac{3}{2} = 1.5$



D: $(-\infty, \infty)$

R: $(-2.25, \infty)$

Con: None

Inc: $(-2.25, \infty)$

Dec: $(-\infty, -2.25)$

3. $h(x) = \frac{4}{x-2}$